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# EUROPEAN PATENT APPLICATION

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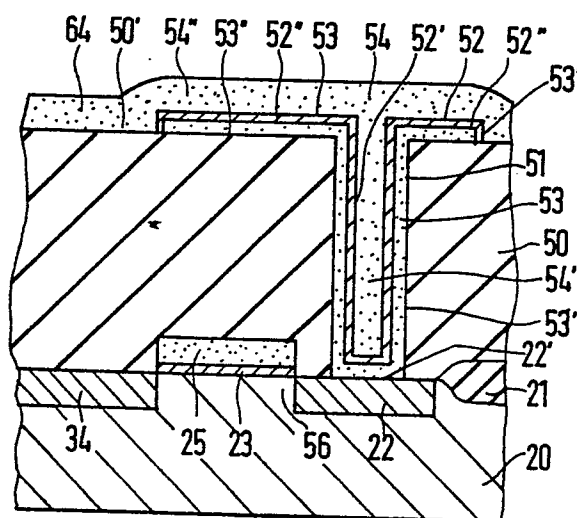
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54 **Semiconductor memory device.**

57 A dynamic memory device of one-transistor memory cell type is disclosed. A thick insulating layer (50) is formed on the transistor (34,56,22) and an aperture (51) is provided in the thick insulating layer to reach source (34) or drain region (22) of the transistor. A MOS type storage capacitor is formed within the aperture (51) and above the upper surface (50') of the insulating layer such that the capacitance of the capacitor within the aperture becomes larger than the capacitance of the capacitor above the upper surface of the insulating layer.



**FIG.3B**



EP 88 10 9300

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                     |                                                                                                                                                              |                                                                                                                                                                                                                                                                                       |                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Category                                                                                                                                                                                                                | Citation of document with indication, where appropriate, of relevant passages                                                                                | Relevant to claim                                                                                                                                                                                                                                                                     | CLASSIFICATION OF THE APPLICATION (Int. Cl. 4) |
| Y                                                                                                                                                                                                                       | PATENT ABSTRACTS OF JAPAN<br>vol. 11, no. 110 (E-496)(2557) 7 April 1987; & JP - A - 61 258467 (HITACHI LTD.) 15.11.1986 * abstract; figure *<br>---         | 1,3,4,6<br>-9                                                                                                                                                                                                                                                                         | H 01 L 27/10<br>G 11 C 11/40                   |
| Y                                                                                                                                                                                                                       | PATENT ABSTRACTS OF JAPAN<br>vol. 10, no. 79 (E-391)(2136) 28 March 1986; & JP - A - 60 225461 (OKI DENKI KOGYO K.K.) 09.11.1985 * abstract; figure *<br>--- | 1,3,4,6<br>-9                                                                                                                                                                                                                                                                         |                                                |
| A                                                                                                                                                                                                                       | idem<br>---                                                                                                                                                  | 2                                                                                                                                                                                                                                                                                     |                                                |
| A                                                                                                                                                                                                                       | DE-A-3 543 937 (KABUSHIKI KAISHA TOSHIBA)<br>* figures 2-12; page 11, line 26 - page 17 *<br>---                                                             | 1                                                                                                                                                                                                                                                                                     |                                                |
| A                                                                                                                                                                                                                       | EP-A-0 194 682 (KABUSHIKI KAISHA TOSHIBA)<br>* figures 1,3; page 4, line 16 - page 7, line 35 *<br>---                                                       | 1                                                                                                                                                                                                                                                                                     |                                                |
| A                                                                                                                                                                                                                       | EP-A-0 046 011 (FUJITSU LTD.)<br>* page 8, line 28 - page 9, line 17; figure *; & US - 4419743 (Cat. D)<br>-----                                             | 1,2                                                                                                                                                                                                                                                                                   |                                                |
| The present search report has been drawn up for all claims                                                                                                                                                              |                                                                                                                                                              |                                                                                                                                                                                                                                                                                       |                                                |
| Place of search<br>BERLIN                                                                                                                                                                                               |                                                                                                                                                              | Date of completion of the search<br>31-08-1989                                                                                                                                                                                                                                        | Examiner<br>JUHL A.                            |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                             |                                                                                                                                                              |                                                                                                                                                                                                                                                                                       |                                                |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                                              | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                                |